IN THE UNITED STATES PATENT AND TRADEMARK OFFICE

Application Serial No. 09/411,171
Filing Date 10/01/1999
Inventorship ....Khurshed Mazhar
Applicant..Microsoft Corporation
Group Art Unit 2173
Examiner..Becker, Shawn M.
Attorney's Docket No. MS1-1583US
Title: Windows Radio Toolbar

DECLARATION UNDER 37 C.F.R. §1.131

As a below named inventor, I hereby declare that:

I am the inventor of the subject matter which is claimed and for which a patent is sought on the invention entitled "Windows Radio Toolbar", as identified above.

Prior to March 18, 1999, which I am informed is the date of a press release by Realnetworks supporting the RealGuide Explorer. Bar, I conceived in the United States, the following ideas as described and claimed in the above-identified application:

* In a computer system having a display device for rendering a graphical user interface of a Web browser displaying Web page content in a browser pane and having at least one speaker for playing a first source of streaming media, said graphical user interface comprising a radio toolbar for displaying at least one button capable of controlling said first source of streaming media irrespective of the Web page content being browsed.

* In a computer system having a display device for rendering a graphical user interface of a Web browser displaying Web page content in a browser pane and having at least one speaker for playing a first source of streaming media, said graphical user interface comprising:

a) a radio toolbar displaying a plurality of radio-toolbar buttons for controlling said first source of streaming media irrespective of the Web page content being browsed, said plurality of radio-toolbar buttons including:

i) a play button for instructing the Web browser to play the first source of streaming media;

ii) a mute button for instructing the Web browser to silence the first source of streaming media;

iii) a volume slider for controlling a volume of the first source of streaming media played over the speaker;

iv) a radio-stations button allowing user selection of the first source of streaming media; and

v) an information area displaying information about the first source of streaming media;

b) at least one explorer bar for providing a display area adjacent to the browser pane, said at least one explorer bar capable of displaying information and allowing user interaction;

c) a menu bar for allowing user control of the Web browser and the Web page, the menu bar including a plurality of menu entries selected from the group consisting of: File, Edit, View, Favorites, Tools and Help;

d) a navigation toolbar that allows user navigation of the Web page, the navigation toolbar including a plurality of navigation-toolbar buttons selected from the group consisting of: Back, Forward, Stop, Refresh, Home, Search, History, Print, Mail and Edit;

e) an address bar identifying an address for the Web page being displayed by the Web browser in the browser pane; and

f) a status bar showing a current status for the Web page.

* In a computer system having a display device for rendering a graphical user interface of a Web browser displaying Web page content in a browser pane and having at least one speaker for playing a first source of streaming media, said graphical user interface comprising at least one explorer bar for providing a display area adjacent to the browser pane, said at least one explorer bar being registered with the Web browser as a band object, said at least one explorer bar allowing user input regarding the first source of streaming media irrespective of the Web page content present in the browser pane.

* A computer-readable medium having computer-executable components comprising:

a) a radio server component for playing a radio source of streaming media irrespective of content being displayed in a simultaneously used Web browser;

b) an interfacing component for communicating with the radio server component; and

c) at least one radio client component communicating through the interfacing component in order to provide instructions to the radio server component regarding the radio source of streaming media.

* * * * * * * * * * *

Prior to the March 18, 1999 press release by Realnetworks supporting the RealGuide Explorer Bar, I conceived the preceding ideas as described and claimed in the above-identified application. Such conception is evidenced by the attached disclosure document entitled, "A design and implementation for the seamless integration of a Web browser and an Internet Radio player using a local client server model". The disclosure document supports the preceding ideas as described and claimed in the above-identified application and is dated prior to the March 18, 1999 press release.

Furthermore, I did diligently pursue reducing the preceding ideas to practice. Dates on the disclosure document and additionally attached email correspondence between myself, other joint inventors, patent counsel and others evidence a diligent pursuit to reduce to practice, the preceding ideas as described and claimed in the above-identified application by filing the subject application.

All statements made herein of my own knowledge are true and all statements made on information and belief are believed to be true. Further, these statements were made with the knowledge that willful false statements and the like so made are punishable by fine or Imprisonment, or both, under Section 1001 of Title 18 of the United States Code and that such willful false statements may jeopardize the validity of the application or any patent issued therefrom.

* * * * * * * * * * *

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Khurshed Mazhar Date: 7/31/03

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Timothy Meece

From: Timothy Meece
Sent: Thursday, April 15, 1999 1:40 PM
To: MSDOCKET
Cc: Pamela Banner; Laura McPherson
Subject: MS133028.1, BW3797.80030 Disclosure Summary

Dear sirs:

The invention disclosure summary for this case is set forth below.

Sincerely,
Tim Meece

Summary of 4/9/99 Disclosure Meeting

Disclosure Title
Windows Radio Tool Bar

MS Ref. No. 133028.1
Our Case No. 3797.80030

Drafting Attorney: Timothy Meece
Reviewing Attorney: Pamela Banner

Disclosure Meeting Attendees
MS: Kurshed Mazhar, David Nadalin, Kymerie Schmidt and Mariah St. Clair
B&W: Pamela Banner, Timothy Meece, Chris Moreno and John Rollins

[redacted]

Brief Summary

[redacted]

[redacted]The UI element seamlessly integrates the radio controls into the [redacted] the following components: a play / stop button, volume controls, a radio stations button, and an information area. This radio-tool-bar UI element solves the usability problems found in the prior art.

[redacted]Each radio server object maintains all [redacted] web browser registers with the server on creation and becomes a client of the radio server. The radio client contains the functionality required to display the UI, operate the radio player, and display status information received from the server. Communication between the client and server can be accomplished in multiple ways such as through: a shared memory, an interface or windows messaging.

Product That Includes The Inventions
Internet Explorer 5.0

U.S. Critical Date

[redacted]

Foreign Bar

[redacted]

Date When A Draft Will Be Completed For Review

[redacted]

Expected Complexity Of Case

[redacted]

```
>
>       <<File: MS133028.doc>><<File: MS133028.vsd>>
>
>       Hi, Tim -- other than Khurshed's comments, the other inventors were
> ok w/
>       this draft.
>
>
>       thanks,
>
>       Mariah
>
>       > -----Original Message-----
>       > From: Mariah St. Clair (LCA)
>       > Sent: Tuesday, May 11, 1999 12:58 PM
>       > To:   Khurshed Mazhar; David Nadalin; Kevin Larkin
>       > Cc:   Mariah St. Clair (LCA); Kymerie Schmidt (LCA)
>       > Subject:      First Draft 133028.1/3797.80030
>       >
>       >
>       > Windows Radio Tool Bar
>       >
>       > Attached is the first draft, including drawings, of the patent
> application
>       > prepared by Tim Meece.  Please review and provide your comments.
>       >
>       >
>       > Please let me know if you have any questions.
>       >
>       >
>       > Thank-you,
>       >
>       > Mariah St Clair
>       > paralegal asst.
>       > Patent Group
>       > x-33742
>       >
>       >
>       >  <<MS133028-1 BW80030 Patent Application.doc>>  <<MS133028-1
> BW80030
>       > Drawings.vsd>>
>       >
>
>
> =================
> Content-Type: application/ms-tnef; name=winmail.dat
>
>
> =================
```

Timothy Meece

From: Mariah St. Clair
Sent: Wednesday, June 09, 1999 5:02 PM
To: Timothy Meece
Cc: Mariah St. Clair; Kymerie Schmidt; Laura McPherson; Pamela Banner
Subject: RE: First Draft 133028.1/3797.80030

Here is the inventor info on this one, Tim. I talked to the inventors today, [redacted]

Thanks much!
Mariah St Clair
paralegal asst.
Patent Group
x-33742

> -----Original Message-----
> From: Timothy Meece [mailto:Meece@bannerwitc.infonet.com]
> Sent: Wednesday, June 09, 1999 9:33 AM
> To: Mariah St. Clair (LCA)
> Cc: Patent Group Docketing Dept.; Laura McPherson; Pamela Banner
> Subject: RE: First Draft 133028.1/3797.80030
>
> Hi Mariah,
>
> Khurshed's changes to this case are fine. Accordingly, the case is ready
> for filing. Could you please email me each inventor's (i.e. Khurshed,
> David & Kevin) full name, address and citizenship info? I will then
> prepare the necessary paperwork.
>
> Thank you!
> Tim
>
> ----------
> From: Mariah St. Clair
> Sent: Monday, June 07, 1999 10:36 AM
> To: Timothy Meece
> Cc: Mariah St. Clair; Kymerie Schmidt; Pamela Banner; Laura
> McPherson
> Subject: FW: First Draft 133028.1/3797.80030

From: Timothy C. Meece
To: msdocket; St_Clair, Mariah
Date: Fri, Oct 1, 1999 11:47 AM
Subject: MS133028.1 BW3797.80030 (Filing Summary)

Dear Sir or Madam:

This is the filing summary for the above-identified case.

The application was filed without formal papers today, October 1, 1999.
Electronic copies of the application and drawings are attached.

[redacted]MS inventors on this case provided us with a good disclosure. In addition, these inventors provided good comments in a timely manner. [redacted]

If you have any questions or comments, please let us know.

Very truly yours,
Tim Meece

Timothy C. Meece
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CC: Banner, Pamela; Cosimini, Donna M.; McPherson, L...

9C30

A design and implementation for the seamless integration of a Web browser and an Internet Radio player using a local client server model

Author: Khurshed Mazhar

Contributors: David Nadalin

Created: Feb 15th, 1999

Revision History:

Abstract

With the emergence of streaming media on the web, there has been a proliferation of Internet audio servers streaming live and recorded radio broadcasts on the net. Until now, the process of browsing web pages has been accomplished using a web browser e.g. Internet Explorer, Netscape Navigator etc. and the listening to Internet radio has been via dedicated players for the playback of streaming web content.

The use of two separate applications to browse and listen to radio has several usability drawbacks:

a) Most implementations for finding Internet radio stations require the use of a browser, it is inefficient to have to launch another application (here a browser) from the radio player app just to a search for a radio station.
b) Access to radio/browser controls requires switching between two applications by the user, which hinder the browsing experience.
c) Internet radio broadcasts typically contain information relevant to item being played which is displayed in most players as text and images, icons e.g. a song being played may accompany information regarding the singer, record company, copyright, company logo etc. Many users are interested in looking up this information whenever the content changes, to achieve this they have to keep both apps side by side and therefore reducing the amount of real estate for the web page display, this is particularly a bigger issue with smaller computer monitors
d) Activation of Internet radio stations URLs on a web page requires launching a separate application, again a very distracting and unpleasant user experience.

The above discussion affirms a compelling need to integrate the web browsing and the playback of radio stations. It is be noted that the browser is the preferred application for this integration since it is the most commonly used application that guarantees Internet access.

One typical integration of radio players with the browser has been to embed the player control in a web page. The obvious limitation to this approach is that the radio station is dependent on the web page that is hosting it, user has no way of changing to a completely a new web page and have his radio station play without interruptions. The solution needed here is to provide a seamless integration of a radio player with the browser application, which is independent of the content that is being browsed.

Since the web browser is an application that can have multiple instances and it is not practical to listen to more than one radio station simultaneously, a number of new challenges appear if we choose to simply merge the radio playback functionality into the browser.

a) Seamless play back across instances not possible
If each radio player is independent, to change to a new station the user has to switch off the radio in the instance the radio is currently playing and switch it on again in the current browser instance. The status of the currently playing station is not easily accessible to the users unless they are browsing in the same instance.
b) Sub-optimal system performance
Having a separate player instance in each browser instance will cause unnecessary network connectivity overhead and loading of DLLs into processes, which can be avoided by smarter design.

The Windows Radio Tool bar solves the above usability issues by the use of a tool bar UI element which allows for a seamless integration with the existing browser tool bars. The integration issues are further resolved by employing a client server approach where a radio server object maintains all the functionality to connect and stream the radio on the machine. Each web browser integrated radio player registers with the server on creation and becomes a client of the radio server. The lightweight radio client only contains functionality to display the GUI needed to operate the player and display status information received from the server.

Specifically the Windows Radio Tool bar UI design solves the usability problems mentioned above as follows:

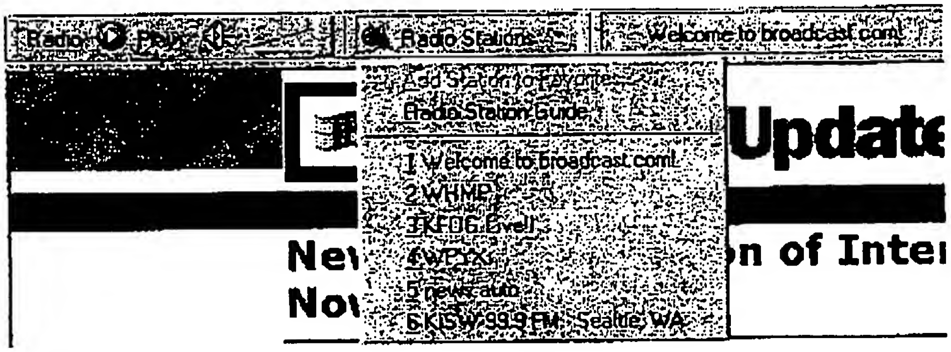
a) A Radio station guide is available as a menu option to quickly take the user to a radio station web page that hosts a compilation of Internet radio stations and a media search engine.
b) Several controls like Start, Stop, Volume, Mute etc are available in close proximity to the regular browser controls. There is hot key access to these UI elements that can facilitate the access even further.
c) Information pane of the radio tool bar provides the user with meta information being transmitted as a part of the broadcast, the user can keep the browser application maximized (or fullscreen for that matter) while viewing this information.
d) Activating a radio link causes the radio to switch to the new station with no distraction of a separate application launch. User can navigate the browser to a different location without affecting his playback.

Item d) is made possible by creating a plugin protocol - a mechanism supported by Internet Explorer browser to allow handling of user defined network protocols (PP) - for the radio (vnd.ms.radio:). All radio links require that this protocol name be prepended before the URL. Our solution does not require a full fledged implementation of a new network protocol instead a stub implementation utilizing the pre-existing protocols and their default handlers has been done. This technique prevents the browser from launching other registered radio players that would normally handle radio files without the prepended PP name.

The client server model resolves the integration issues in the following manner:
a) The radio server broadcasts an update message to all instances of the player which allows for all the players (radio clients) to have their UI synchronized to display the same play state and station information. Playing a new radio station in any instance of the browser automatically switches off the old station and starts the new one since all station connectivity and playback happens on the radio server.
b) Clearly having light weight radio clients with only UI implementation decreases the memory foot print and load time for any browser instance (hence over all system as well).

Windows Radio Tool bar design and implementation details

Radio Client User Interface



The radio client is a tool bar inside of the Internet Explorer 5.0 browser. It is composed of the following components:

Play / Stop button

Volume Controls
Radio Stations Button
Information Area

Play / Stop

The Play / Stop button is designed to communicate to the user that the radio is on or off. The same way their radio works today.

Play

The Play button has 3 states.
Enabled
Disabled
Highlighted

Disabled
If no content is loaded in the Radio. The button is disabled. The disabled state is a flat Grey, play button. This state can only occur if NO content has ever been played by the radio. Once content has been played by the radio, the last station played is "loaded" therefore this button is enabled.

Enabled
If the user loads a station, the button is enabled, and has a green rollover state. Clicking the button executes the playing of the radio station and changes the button to the Stop button.

Play Rollover
If the user Mouses over the Button, the button highlights. The highlight is the Green triangle.

ToolTip
The Button has a roll over tool Tip. It says "Play"

Stop

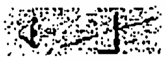
The Play button has 2 states.
Enabled
Highlighted

Enabled
Once the user has begun playing the radio, the button changes to the stop button. Clicking Stop stops the radio station and changes the button state to play.

Stop Rollover
If the user Mouses over the Button, the button highlights. The highlight is the Green square.

ToolTip
The Button has a roll over tool Tip. It says "Stop"

Volume Controls



The Volume control consists of 2 Pieces. The Mute button and the Slider.

Mute Button

Mute button has 4 states.

Inactive

If the user does not have a sound card installed or DirectShow cannot modify the volume, the MUTE button is disabled.

Active

The MUTE button is enabled regardless of content being played.

Active Rollover

If the user mouses over the Button, the button is highlighted.

Muted (Depressed)

When the user clicks the MUTE button, the button appears depressed to indicate that the volume is muted.

ToolTip

The Button has a roll over tool Tip. It says "Mute"

Volume Slider

Mute button has 2 states.

Inactive

If the user does not have a sound card installed or if the system cannot modify the volume, the Slider is disabled.

Active

The Volume Slider is always active irrespective of whether there is station playing or not. This allows the user to adjust the volume before listening to content, as well as when the control is muted. The volume slider is straightforward. Sliding the control to the left lowers the volume. Sliding the control to the right raises the volume. The Slider only adjusts the Radio stream volume.
Clicking to either side of the slider causes the handle jump to the exact spot the user clicks. The click region is the width of the triangle and the vertical extent of the handle.

Volume persistence

When the user exits the browser or turns off the Radio, the volume setting chosen by the user is persisted so that next time they launch the Radio, the volume will be at the same setting.

ToolTip

The Button has a roll over tool Tip. It reads "Volume Control."

Information Area

Information area consists of 2 pieces. The information window and the icon. The information window presents the user with the meta data associated with the radio station.

Icon

The icon has 2 states. The standard Active grey state, and the rollover state. The icon does not represent any additional functionality. It simply shows the user that the window has focus.

Information Window

The information window displays the meta data information in the ASX file, as well as communicates status of the connection.

If no file has been loaded, then the status window is blank.

Status

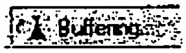
The Information window is the primary method for the user to get status. The status conveyed by the Radio consists of the following:
Status Icon
Status text

Status Icon

The Status icon represents to the user the status of the connection. If the user is connected and playing, or not connected and stopped, the icon is the meta default icon.

Buffering / Opening / Connecting

Streamed media goes through a number of states when connecting to a stream. The radio icon, with a progressing circle represents the state of this. As buffering continues the circle builds from no circle at all to a complete circle. Once the circle has been completed, the process starts all over again until a connection is made, or an error occurs.

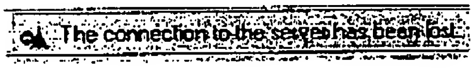


Buffering...

The status icon has a rollover state that is colored.

Errors

Occasionally while connecting to a server and while streaming media, an error can occur. When an error occurs, the errors are passed to the radio bar and displayed in the information window. The icon also changes to the Error icon.



The connection to the server has been lost.

The error icon has a rollover state that is colored.

IE Status

In addition to media status appearing in the status window, the same status is displayed in the IE status window in the lower left of the browser.

Additionally, the radio bar causes the spin the E logo when connecting to a server. Once the connection is established or an error occurs, the E stops spinning.

Meta data information

Once a connection to a server is established, the window displays the meta data once. Information is displayed in the following order:
Show
Clip
Author
Copyright

There is a 2-second delay between showing each individual string. Once the entire detail has been displayed, the information window stops on Station Name.

To review the meta data, the user simply needs to move the mouse into the information window. Moving the mouse in starts the ASX data to cycle through again.

If no ASX file is loaded, or the content contains no meta data, then the text displayed in the window reads, "There is no additional information for this station."

HREFs

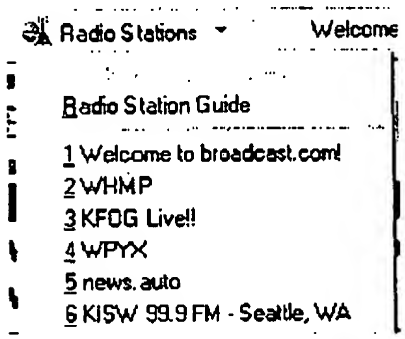
ASX meta data supports HREFs associated with them. If there is an HREF associated with the ASX data, mousing over the data shall causes the data to underline, thus indicating the link. Clicking on the link launches a new IE instances and navigates to the specified web page.

ToolTip

The tool tip of the Information Windows displays the entire meta data string. This is important especially when the window does not display the entire text of the meta data.

Status and Error Messages

Because the same window displays the status and the meta data, it is important to note that the status and error message take precedence over the meta data. Any change in status or error shall display immediately in the window.



Radio Stations Button

The Radio Stations Button is a menu drop down button that allows the user quick access to adding content to the favorites, finding new stations, and a MRU.

The Radio Stations Button has the following states.

Active

The Radio Stations Button is always active.

Active Rollover

If the user mouses over the Button, the button highlights.

ToolTips:

When rolling over the Radio station button, the following ToolTip is displayed,
"Radio Station"

Add Station to Favorites

This menu option launches the IE Add to Favorites dialog. This allows the user to add the currently playing stream to their favorites folder.

The Add Favorite Dialog shall have the following pieces:

Name

The default text for Name shall come from the ASX file.
If there is a Station provided in the ASX file the station shall be the default text.
If there is no Station, then the default text shall be the Show.
If there is no Show, the name of the ASX file itself is used.

Create in

The Create in button expands or contracts the Add Favorite dialog the same as it does in IE.
Clicking on the Create in button initially expands the dialog to present the user categories under the "Favorites" folder. The user can create a new folder by clicking the New Folder button.

Radio Station Guide

The Radio Station Guide is an online web page that directs users to locate radio content.

MRU

The Menu contains 6 most recently used entries. The entries in the MRU are the last 6 successfully opened stations.
If the user connects to a 7th station, the Last accessed station is removed from the list and the 7th becomes one of the 6 stations in the MRU.

Selecting a MRU causes the station to be loaded in the radio bar, and makes it the "most recently used" therefore the last station to be removed.

MRU's are sorted in order of most recently used, and enumerated appropriately. The most recently used appears at the top of the list.

The limitation of 6 MRU's is taken from a registry setting. We can adjust the setting to be larger if 6 appear to be too few.

Radio links & Pluggable Protocol (PP) handling

A radio link is defined to be any valid audio stream URL prepended by "vnd.ms.radio:". Activation of a radio link results in our handler for vnd.ms.radio getting called by the system. This stub handler than passes the radio URL to the radio client which in turn calls the server on its interface.

Radio Client Server Architecture

Server creation and system registration

1. The radio server is created as a multi threaded object (if not already running) in the same process as the windows shell by the first radio client that gets instantiated within a browser instance. The server could have existed in its own process but we make an attempt at minimizing the number of processes created on the system.
2. The server creates a new thread on which creates its helper objects on which it relies for its system needs like connecting to the network, playing the audio stream etc. This is done for stability reasons. Note this extra thread created by the server warrants it to be multithreaded since it will receive calls from hits helper objects (notifications or events of server state change) on this this thread as well as from radio clients calling into the server on a separate thread.
3. The server than uses the system Running Object Table (ROT) to register itself.
4. The server also establishes a shared memory structure which maintains the server state (current playback state and end user stream information) for all the clients to examine. This is done to avoid expensive inter process communication between the server and the all clients whenever this information (which can frequently) changes.

Client creation and server registration

5. The newly created client is able to get access to the running instance of the server by looking up the ROT entry (note in step 1 we have guaranteed server to be available now)
6. The client registers itself with the server via a private interface. The server internally maintains a list of all registered clients.
7. The client binds to the shared radio memory.

Normal client server operation

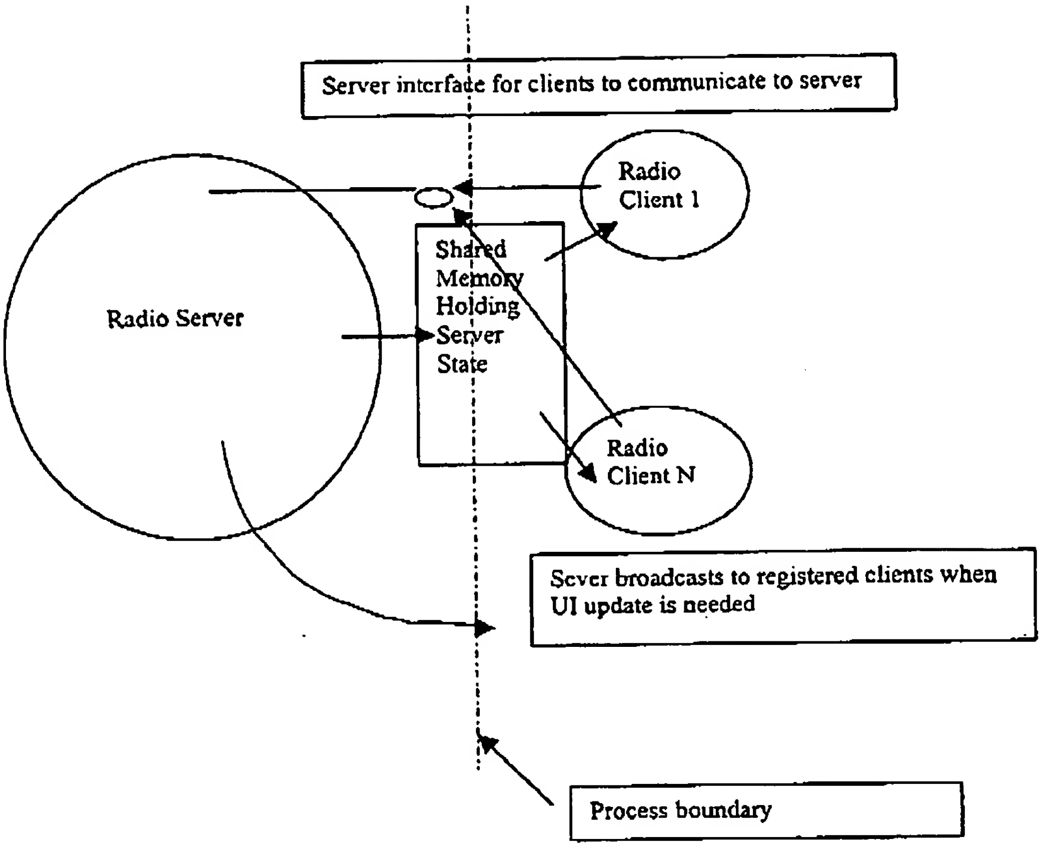
8. When a radio link is activated (various mechanisms MRU, vnd.ms.radio link on a web page, shortcut), the client receives the URL to the radio station and uses the cached server interface to ask the server to stream and play the particular station.
9. As the server state (connectivity status, playback, errors, end user stream info) changes, the server updates the shared memory cache and posts a message to all the registered to clients to update their UI.
10. The end user UI interaction (Start/Stop playback, Mute, Volume changes, change station) generates calls from the client to the server via the server interface held by the client. Note that in this model the server itself never calls the client directly on an interface. This is the due to the Shared memory performance optimization.

Client shut down and server unregistration

11. When a radio client is switched off (explicitly or as a result of browser instance shut down), the client unregisters itself with the server using the cached server interface. On client unregistration the server removes the particular client from the client list and will no longer post update messages to it.
12. The client unbinds itself from the shared radio memory.

Server shutdown and system unregistration

13. When the last radio client is closed (switching of the radio tool bar via context menu or shutting browser instance) the radio play back is stopped (if playing). As far as the end user is concerned there is no radio playback in this state.
14. As an optimization the radio server object stays alive (in the anticipation that another client might get opened shortly) for the next N seconds (the default is 300 seconds (5 min), setting can be changed via the registry).
15. After N seconds the server unregisters its from the system ROT, releases the shared memory and all the system resources and helper objects and terminates its thread.


Server interface for clients to communicate to server
Radio Client 1
Radio Server
Shared Memory Holding Server State
Radio Client N
Sever broadcasts to registered clients when UI update is needed
Process boundary